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THE RELATIONSHIP BETWEEN CAREER AND TECHNICAL EDUCATION
INTENSITY AND COLLEGE AND CAREER READINESS OF HIGH SCHOOL
SENIORS

By

Kelly Means

A DISSERTATION

Presented to the Faculty of

the Graduate College of the University of Nebraska at Omaha

in Partial Fulfillment of Requirements

For the Degree of Doctor of Education

Major: Educational Leadership

Under the Supervision of

Dr. Tamara Williams, Chair

Omaha, Nebraska

April, 2018

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Abstract

THE RELATIONSHIP BETWEEN CAREER AND TECHNICAL EDUCATION INTENSITY AND COLLEGE AND CAREER READINESS OF HIGH SCHOOL SENIORS

Kelly Means, Ed.D.

University of Nebraska Omaha, 2018

Advisor: Dr. Tamara Williams

High school is an educational environment intended to produce graduates who are prepared for the future. Career and Technical Education (CTE) programs offer courses focused on specific career knowledge and skills intended to prepare students for college and career. Are these CTE opportunities resulting in high school graduates who are college and career ready? This study looks to examine the relationship between the intensity of Career and Technical Education experiences and seniors' college and career readiness. The study participants represented the 2016 graduation cohort from one Midwest school district. Traditional student and school success factors of attendance and grade point average were used as measures of college and career readiness. The CTE intensity of students was determined by the enrollment in elective courses designated by the district as career and technical. The study also looked at the perceptions of students for intent versus reality, utilizing results of a pre-graduation survey for future plans versus a six-month post-graduation survey reporting what the student is doing. The study showed no statistically significant relationship between high school seniors cumulative unweighted grade point average and CTE intensity. The study showed no statistically

significant relationship between high school seniors attendance and CTE intensity. The study showed no significant difference in the post-graduation intent versus post-graduation position as related to CTE intensity.

Acknowledgements

A huge thank you to my committee for your guidance throughout this doctoral journey. The opportunity to seek input from various perspectives was instrumental in the development and completion of the process. Dr. Tamara Williams, my advisor, you have been irreplaceable throughout this journey. You truly listened and challenged me to go beyond what I thought was even possible. Whether to question me, to push me out of my comfort zone, or to put it ALL in perspective, you knew exactly what I needed when I needed it. I am so grateful for the time and effort you put in to keeping me on track.

To my OPS work family, it has been a journey. Your words of encouragement got me through the rough times and kept me focused on the goal at hand. No one could ask for better co-workers than all of you!

I would like to thank my parents for their overwhelming support. As a child you taught me the importance of learning and following through on what you start. Without these teachings, I would not be here today. You instilled in me the desire to always strive for more and never give up. Throughout my educational journey, you have been there to support my choices and pathways which means more than you will ever know.

Finally, to my husband Mike. It is difficult to express in words what you mean to me, not only as a part of this journey, but as the constant in my life. Unlike anyone else, you stand by me no matter what. Supporting me through the laughs, tears, and stresses of this journey have not been easy, yet there you were. Achieving this goal would not have happened without you.

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CHAPTER ONE: Introduction

The high school experience. No matter what people remember from their time in high school, it will most likely be different for everyone. Many opportunities exist during these years in school, leading to the varying paths a student may take following graduation. There is one consistent piece of the high school experience which allows for a standard of completion: graduation requirements. These specific requirements must be met, without exception, to be considered a high school graduate. What does it mean to be a high school graduate? A high school graduate is determined by the number of credits a student has earned. The combination of the core requirements and non-core courses to obtain a specified number of credits create the high school experience. Does earning the credit mean you are prepared for the future? Whether moving on to college or career, did high school provide the needed knowledge and skills? Is there a connection between courses taken in high school and the readiness of students for college or career? How do we know the high school experience is successful in producing graduates prepared for the future?

First and foremost a graduate has received a specified number of credits. Credits can be categorized differently based on school districts; however, all credits refer to designated courses that are taken within a sequence while earning at least a passing grade. Core credit requirements in the Midwest commonly include a minimum of 4 years of English, 3 years of Math, 3 years of Science, and 3 years of Social Science. These core requirements are specifically defined courses, without alternatives, to be taken during high school. Each state sets minimum graduation requirements; however, local

school boards may determine specific requirements beyond the minimum. In addition to the required core courses for graduation, a student's high school schedule includes other areas considered non-core. Students earn credits in these non-core courses; however, not all students are required to complete the same sequence. Students choose to participate in these non-core courses, called electives, based on personal interest, knowledge, or skills. These elective courses commonly include the curricular areas of physical education, foreign languages, fine arts, and practical arts.

Within these elective curricular areas exists Career and Technical Education (CTE) programs. Even though most students are unaware of the overall design, these programs encompass various elective courses related to specific career endeavors. As students progress through their high school years, they determine the participation in CTE by their course selections. CTE courses may be taken as an individual course or as a sequence of courses, known as a program of study. A program of study consists of a minimum of three semester courses focused on a certain career path. The program of study contains a scope and sequence that builds on knowledge to provide a learning opportunity beyond basic introduction.

Whether stand alone or as part of a program of study, the number of courses students elect to enroll in determines the intensity of their CTE experience. These course choices are influenced by a student's interest or future goals, thus resulting in varied high school experiences. CTE courses not only aid a student in earning credits toward graduation, but also provide him/her an environment to develop career skills that can impact the future.

This study looked at the relationship between the intensity of CTE experiences and students' college and career readiness. Although CTE courses span secondary, post-secondary and adult education, this study will focus specifically on the high school experience. For this study, college and career readiness of high school seniors was determined using common measures of a student's high school success: cumulative unweighted grade point average (GPA) and school attendance (engagement).

Student response data regarding post-graduation intent and post-graduation position were also reviewed. Post-graduation intent is the expectation, prior to graduation, that students have for their path following high school. Post-graduation position refers to the reality of where a student is following graduation. Does the intent of what the student plans to do equal the reality of what the student is actually doing? Using common measures of student success, does the high school experience produce college and career ready graduates?

Although GPA and attendance are common student success measures, the most common rate of measure for schools and districts is graduation rate. Graduation rate looks at the students in a given class cohort who met the graduation requirements within a designated timeframe. Outside of verifying that students received credits in the core requirements, course content and selection are not reviewed. Graduation requirements are based solely on the earning of credits. Is reporting the percentage of the student cohort that met the graduation requirements enough to determine the preparedness of students for college and career? Are common measures of student and school success appropriate for holding schools accountable for graduates?

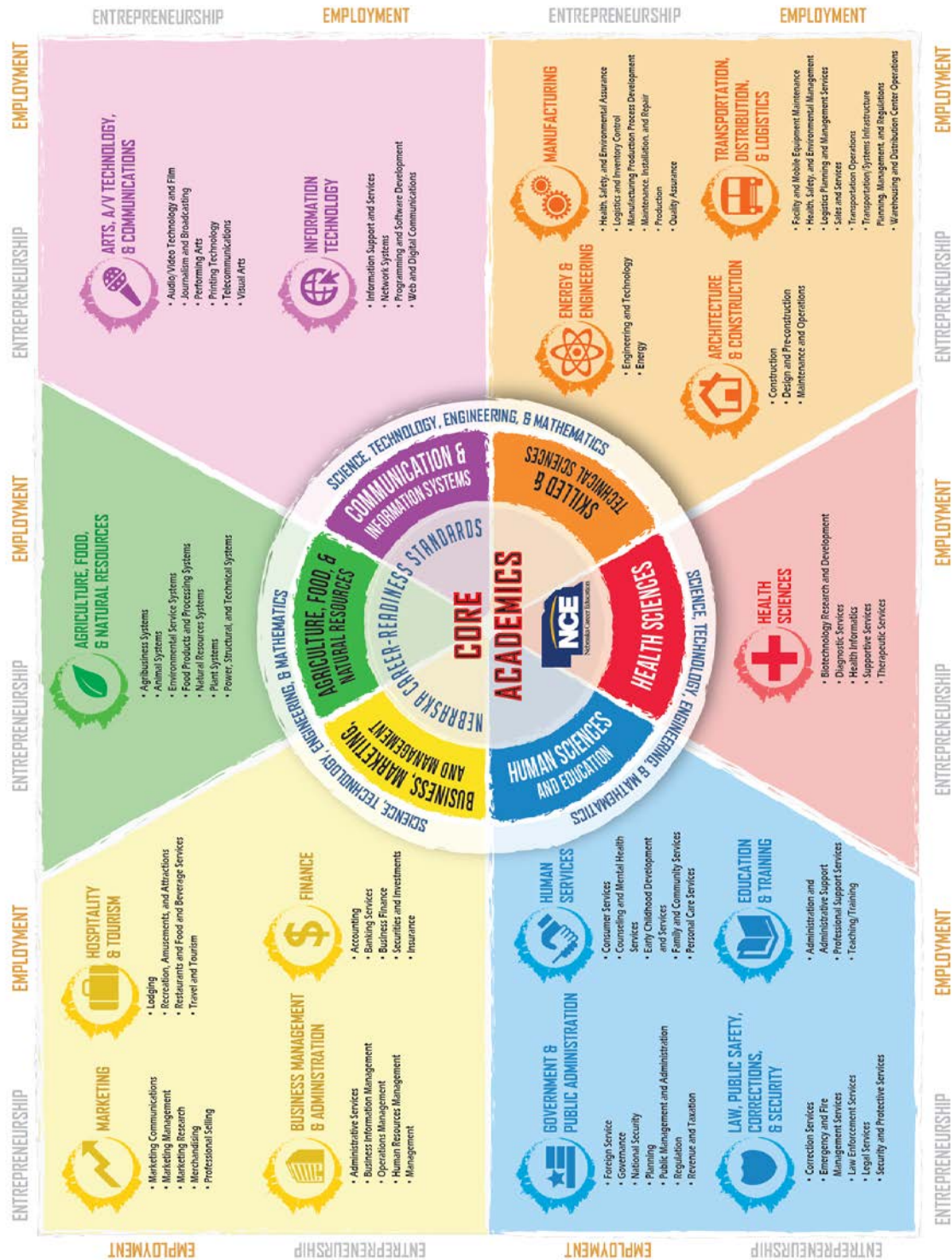
As of 2016, a total of 34 states, including Nebraska, used some form of college and career ready performance indicator in their state accountability measure (Achieve, 2016). Through Accountability for a Quality Education System, Today and Tomorrow (AQuESTT), schools are responsible for meeting requirements of two categories divided into six tenets. One category focuses around Student Success and Access which includes tenets for Positive Partnerships, Relationships, and Student Success; Transitions; Educational Opportunities and Access. While the second category looks specifically at Teaching and Learning through tenets of College and Career Ready; Assessment; and Educator Effectiveness. Through these tenets the goal is an accountability system that goes beyond ranking schools utilizing a snapshot of academic test scores and graduation rates and looks at the journey of the student, school and teacher. The approach of the AQuESTT system “views each student holistically, classifies all schools into four performance levels, and provides opportunities for every Nebraskan to get involved” (NDE, 2016, para. 2).

The College and Career Ready tenet is founded on the “belief that every student upon completion of secondary education shall be prepared for postsecondary opportunities and to pursue his or her career goals” (NDE, 2016). Although all tenets work in collaboration to make up the accountability model, this tenet directly aligns with programs that currently exist in schools as Career and Technical Education.

Framework

In this study, the Nebraska Career Education Model is used as a framework for Career and Technical Education (see Figure 1).

FIGURE 1: Nebraska Career Education Model Reprinted from NDE, Career Clusters, retrieved from <https://www.education.ne.gov/nce/career-clusters>



Introduced nationally in the 1970's to emphasize the need for additional career focus for students, the career model revolves around established career clusters. As vocational education has transitioned to CTE, the career cluster model gained momentum in the 1990's; this momentum included support from educational leaders and influencers to implement the model (Ruffing n.d.). Minor adjustments have been made over the years, but many clusters have remained consistent. Nebraska, like other states, has taken the national model and made minor alterations to meet the specific and unique requirements of the state.

The Nebraska model is comprised of 16 career clusters organized in 6 career fields. The 16 career clusters as designated in Nebraska include: Agriculture, Food, and Natural Resources; Architecture and Construction; Arts, A/V Technology and Communications; Business Management and Administration; Education and Training; Finance; Government and Public Administration; Health Sciences; Hospitality and Tourism; Human Services; Information Technology; Law, Public Safety, Corrections and Security; Marketing; Manufacturing; Science, Technology, Engineering, and Mathematics and Transportation, Distribution, and Logistics. The career clusters provide career areas with a broad category or an industry focus.

Nebraska's 6 career fields provide a wide-range of careers based on commonality. The career fields categorize the various career clusters in a way that students can understand the multitude of career options within an area of interest, as well as recognize the overlap of knowledge and skills. Although similar in title to some of the 16 career clusters, the career fields are more broadly defined to accommodate transferability of knowledge and skills to any cluster with the field. The career fields include Agriculture,

Food, and Natural Resources; Business, Marketing, and Management; Communication and Information Systems; Health Sciences; Human Services and Education; and Skilled and Technical Sciences. As students develop knowledge and skills in any career field of interest, it does not mean they are ‘locked’ in to one occupation. The knowledge and skills are transferable to multiple occupations that fall within the career cluster (Miller, 2008; Ruffing, n.d.).

Seventy-nine specific career pathways are part of the Nebraska model. Career pathways exist within each career cluster and are instrumental in guiding curriculum around designated programs of study. Figure 2 illustrates the connection between the components of the career model. They begin with a broad career category in the career field and career cluster, narrow to career pathways which have some commonalities in skills and knowledge, and result in possible career specialties that require particular trainings and qualifications.

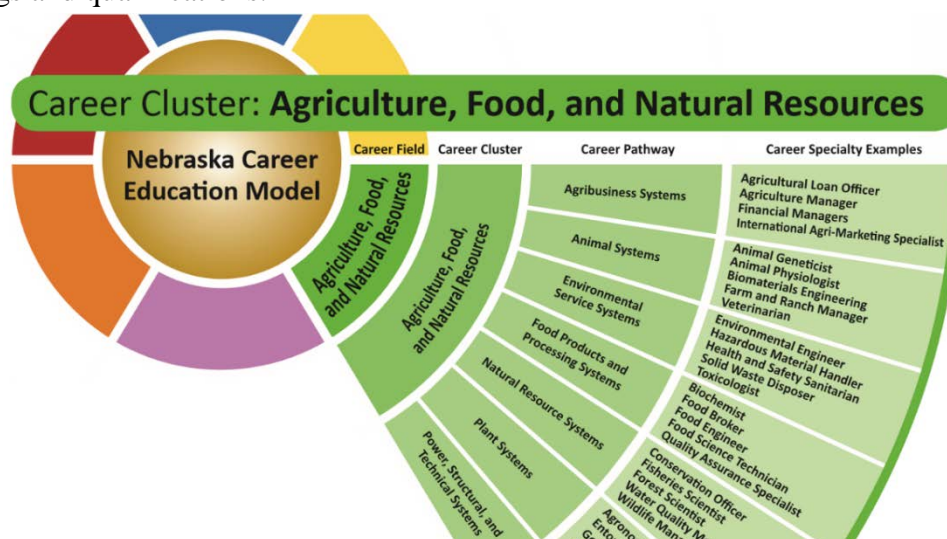


FIGURE 2: Connection of Career Field, Career Cluster, Career Pathway, Possible Career Specialty Reprinted from NDE, Career Clusters, retrieved from <https://www.education.ne.gov/nce/career-clusters>

The program of study mimics this connection intending to engage participants through an introductory level of the career area to developing specific knowledge and skills relevant to that career pathway. The sequencing of courses is articulated in a manner that builds student knowledge and skills in a pathway leading to post-secondary opportunities, industry credentials or employment (ACTE, 2008a).

The design of the career model to incorporate career fields, career clusters, and career pathways aids in creating a connection as students prepare for the future. Students are aware of the options available to them no matter the path they choose – four-year postsecondary, two-year postsecondary, full-time employment or military (Reese, 2005).

Core academics are at the center of the Nebraska Career Education Model. As critical components for each student regardless of chosen career field, core academics continue to be the foundational piece of the education experience. Legislation allocating funding for CTE requires state reporting of performance indicators incorporating core academics in efforts to hold schools accountable for meeting goals of CTE funded initiatives and programs (NDE, n.d.).

Surrounding the core academics, in the model, is the integration of Nebraska career readiness standards. Career readiness standards (see Figure 3) were developed to further prepare all students for post-graduation opportunities and are not intended to be exclusive to CTE courses (NDE, 2012). According to the 2012 Career Readiness Booklet, “the Nebraska Standards for Career Ready Practice were derived from extensive input from business and industry representatives expressing the most critical skills

needed for employee and/or entrepreneur success” (p. 9). Nebraska’s career readiness standards were officially adopted by the State Board of Education in 2011.

The components of the Nebraska Career Education Model include instruction for students working from the center outward. The initial educational emphasis is on core academics and career readiness standards for all students. Moving outward to the career areas which allow students to learn about the broad areas of their interest. The career clusters and pathways provide the platform to introduce students to specific knowledge and skills needed to pursue careers at all levels within the cluster/pathway of interest. The

The career ready individual . . .

1. Applies appropriate academic and technical skills
2. Communicates effectively and appropriately
3. Contributes to employer and community success
4. Makes sense of problems and perseveres in solving them
5. Uses critical thinking
6. Demonstrates innovation and creativity
7. Models ethical leadership and effective management
8. Works productively in teams and demonstrates cultural competency
9. Utilizes technology
10. Manages personal and career development
11. Attends to personal and financial well-being

FIGURE 3: Nebraska Standards for Career Ready Practice Adapted from NDE, 2012, p. 12.
<https://www.education.ne.gov/nce/careerreadinessstandards/>

organization of the model aids in the alignment of secondary education, postsecondary education and employment, as well as, provide a bridge of classroom learning to pursuing of future personal goals (Miller, 2008; Hooley, Marriott, & Sampson, 2011).

Purpose of the Study

The purpose of this study was to examine the relationship of Career and Technical Education intensity as defined by the number of CTE courses taken and high school

seniors college and career readiness factors. The study looked at the cumulative unweighted grade point average, attendance, and post-graduation intent versus post-graduation position related to the intensity in CTE.

Research Question

What is the relationship of career and technical education intensity and high school seniors college and career readiness factors?

Definition of Terms

Academic Skills – Academic skills include both basic skills of reading, writing, and arithmetic as well as specialized skills pertaining to an interest or career.

Attendance – Attendance refers to the number of days absent during the four-year high school experience.

Career and Technical Education (CTE) – CTE encompasses a rigorous and relevant educational offering focused on the development of foundational knowledge and skills, core workplace competencies, and specific skill competencies in various occupational areas (Scott & Sarkees-Wircenski, 2004).

Career Cluster – A career cluster is a “grouping of occupations and broad industries based on commonalities” (Blosveren, 2015).

Career Field – Career fields are six broad groupings of the 16 different career cluster areas based on commonalities among clusters (Nebraska Department of Education [NDE], 2015).

Career Pathway – A career pathway represents a small group of career opportunities within a career cluster that have common academic and specialized knowledge and skills (Association for Career and Technical Education, 2008a).

Career Ready – A career ready person is one that “capitalizes on personal strengths, talents, education and experiences to bring value to the workplace and the community through his/her performance, skill, diligence, ethics and responsible behavior” (NDE, 2012, n.p.).

Carl D. Perkins Vocational Education Act of 1984 – Legislation that continued the initial funding and designation of programs in the Vocational Education Act of 1963. Act named after vocational education advocate Carl D. Perkins.

Carl D. Perkins Vocational and Applied Technology Education Act of 1990 – Legislation that brought additional accountability through academics and alignment to post-secondary.

Carl D. Perkins Vocational and Technical Education Act of 1998 – Legislation that continued emphasis on accountability and academics, but adjusted state funding authorization.

Carl D. Perkins Career and Technical Education Improvement Act of 2006 – Legislation that brought about Career and Technical rather than Vocational and introduced programs of study.

Cohort – A cohort refers to a group of students that share a common demographic or statistical characteristic.

College Ready – College ready refers to a high school graduate that has “the knowledge and skills necessary to qualify for and succeed in entry-level, credit-bearing college courses without the need for remedial coursework” (Achieve, 2009).

Concentrator – A Career and Technical Education concentrator is a student that completes at least three semester-long courses within a career cluster or career pathway throughout their 4-year high school career (NDE, 2015).

Content Standards (Standards) – Standards are “a set of broad, overarching content-based statements that describe the basic cognitive, affective, or psychomotor expectations of students” (NDE, n.d., p. 4)

Core Academics – Core academics are the foundational courses in English, math, science, and social science that are required for high school graduates.

Cross-walked Standards – Cross-walked standards refers to the process of aligning learning within a program of study to state approved academic standards.

Cumulative Unweighted Grade Point Average – Cumulative unweighted grade point average refers to the grade point average for a student that uses a scale from one to four and spans the entirety of the high school years. An unweighted cumulative grade point average awards the same number of points for grades in courses regardless of class level.

Elective – An elective is a course that is not part of the core academics (English, math, science, social science). An elective course is open for participation by any student that chooses to take the course and who has met prerequisites.

Intensity – Intensity refers to the number of unique CTE courses taken by a study participant. The higher the number of courses, the greater the intensity.

Post-graduation Intent – This intent is the expectation prior to graduation that students have for their path following high school.

Post-graduation Position – Post-graduation position refers to the reality of where a student is following graduation.

Program of Study – A program of study, at a minimum, is a sequence of three semester-long CTE courses identified by the state within a career cluster or career pathway.

Stand-Alone Program – A stand-alone program is an educational setting that exists as part of a school district, but outside of a traditional school. Although staffed by certified educators providing similar course offerings, a stand-alone program serves the needs of a specified student population. Often referred to as alternative programs, these stand-alone programs operate within their own building to accommodate flexible scheduling and self-pacing.

School-to-Work Opportunities Act of 1994 – Legislation that emphasized partnerships between school and industry.

Vocational Education Act of 1963 – Legislation that expanded vocational education to all persons of all ages.

Limitations

Data analysis that includes Spearman rank-order correlation only determines if a relationship exists between the variables. Association of the variables does not represent any causal relationship.

Student responses to post-graduation intent and post-graduation position include the options unavailable, undecided, and other. There is no clear definition or explanation of what these responses mean. When comparing responses of intent to equality of position, some students were unavailable for a response; however, the response may have matched had they been able to be contacted.

Delimitations

Within the study data regarding course history, the researcher removed courses which were CTE courses, but were not elective in nature. The required courses of Economics and Financial Literacy, Honors Economics and Financial Literacy, Dual Language Economics and Financial Literacy and Honors Dual Language Economics were removed as they each satisfy a social science graduation requirement. Various Freshmen success courses (Goals & Pathways for Success, FACTS, FACTS lab, H FACTS 1 & 2, and Dual Language FACTS) were removed since they are a school requirement at that grade level. Requiring all Freshmen to take the course removes the choice aspect of the elective credit. Human Growth and Honors Human Growth were also removed as they are required graduation courses, unless the student has a parent exemption.

The Midwest school district where the study was completed has seven high schools and various stand-alone programs that serve at-risk populations. For this study, the researcher only utilized student course history from the seven high schools and did not include courses that were taken through the stand-alone programs serving at-risk populations.

Study data limited participants to those who were continuously enrolled in the Midwest school district during their high school career. Participants must have been enrolled in the district for more than 679 days to be included in the data set.

Assumptions

The study assumes students attending the same school district for the entirety of their high school career have consistent content scope and sequence in courses taken. Each course of the same name, no matter the school or teacher, must meet the same course content standards. Therefore, the assumption is that students are choosing courses based on interest and content rather than unrelated course components.

When reviewing post-graduation intent and post-graduation position responses, the study assumes that students were truthful in the responses provided. Since post-graduation intent is a student's perceived plan there is no way to verify the response matches the path a student plans to take. In addition, post-graduation position is also not individually verified through any other process outside of the student response.

Significance of the Study

The educational system is judged every day. One school's success is compared to another and vice versa. In many cases, these measurements are used by educational

leaders to make decisions regarding programs, outside of the required core academics, which will be offered in the high school. Programs must add value to the high school experience for the student, as well as provide measures of accountability for schools. Can the high school experience be a way for students to find the spark to ignite the personal passion and keep them engaged and ultimately enrolled in high school? Are students choosing to participate in CTE courses better prepared for college and career?

Traditional measures of school and student success (graduation rate, academic test scores, grade point average and attendance) can be used to provide a snapshot in time of the high school experience. As legislation provides new indicators incorporating college and career readiness into the success parameters of schools and students, are the traditional measures of success still applicable?

A goal of education has always been to support the economic growth of society by preparing the next generation to be contributing members. Education evolves to accommodate for societal change, but the underlying premise remains. In a 2010 poll, approximately “two-thirds [of national voters] believe that a high dropout rate has a lot of impact on the nation’s economy and similarly on America’s ability to compete in the global economy” (Alliance, 2010). By engaging high school students deeper through contextual and experiential learning within a chosen area of interest, can it lead to sustainability of career success? Such experiences contribute to preparedness of graduates to do more than earn credits while developing the knowledge and skills to be college and career ready and society’s next leaders and innovators.

Organization of the Study

Chapter two presents the literature relevant to the research study. This chapter provides background leading up to today's career and technical education program, accountability measures for high schools, student success characteristics and career and technical education, an overview of the Nebraska Career Model, and college and career readiness requirements for education. The study design, participants, data collection, research questions and procedures for data analysis are described in Chapter three. Chapters four and five provide the results of the data analysis, present conclusions of the study, and implications for future research.

CHAPTER TWO: Review of Literature

Introduction

What do you want to be when you grow up? A question commonly asked of children and young adults. The answers tend to be just as common: doctor, astronaut, athlete, nurse, performer or a scientist. Intent behind the question in schools is to get students thinking about their futures. But does this question encourage students to really think of their future selves? Is it feasible to ask students to make such a life choice without any prior knowledge or experience? Education is meant to prepare students for the next phase of their lives. How are schools supporting students to make future plans feasible? Are courses being offered to build content knowledge needed for future endeavors? What experiences are available to students to gain the skills necessary for college and career? Are people destined to work in a job that was chosen by their “unthinking sixteen-year old selves” (as cited in Hooley, Marriott, & Sampson, 2011)?

In efforts to prepare students and meet previous federal guidelines, school districts were focusing on core academics. Schools being ranked for effectiveness through standardized test score proficiency and graduation rates have an inherent connection to the subjects of English, math and science. As guidelines shift and education is scrutinized for lack of graduate preparation, how do educational and school leaders make decisions for limited financial resources? Decisions are being made regarding programs available to students in school without necessary research of student outcomes to inform the decisions (Castellano, Stringfield & Stone, 2003).

Students meet the requirements of a high school education through earning a specified number of credits, thus receiving a diploma. In the early 80's schools followed the recommendation of the National Commission on Excellence in Education and began requiring three years of math, science, and social science along with four years of English. Since this time, graduation requirements have continued to be reviewed and often minimums surpassed at the state or even district level. The focus on core credit attainment shows through the increased participation of high school graduates in the total number of academic courses taken -- an increase of 31% from 1982 to 2000 (Bishop & Mane, 2005).

Securing a high school diploma should provide insight into the skills and abilities of the student. Does earning the high school diploma signify competencies in various knowledge and skills? Employers are providing a perspective that states not necessarily. Employers continue to express concerns with employee preparation for work. Specifically, they desire workers with increased communication skills (both reading and writing), and greater technical ability and overall employability skills (Association for Career and Technical Education, 2008b).

Job opportunities available to graduates has shifted over the last 10 years. The once common repetitive and routine job has been replaced by the need for workers who are able to interact with others and think on their feet (Council of Chief State School Officers, 2017). Employment options for those with only a high school education have “declined from 72 percent to 38 percent, and wages for workers in this group have declined 15 percent” since the manufacturing high of the 1970's (Carnevale, 2016, para.

9). Is the high school experience resulting in students who can fill the current workforce demands?

Going beyond high school graduates who have gained a diploma, to the development of college and career ready graduates who possess the desired skills employers are looking for requires a change in practice. Through career and technical education students are provided a place to initiate personal interests and develop skills that transcend the high school experience. Career and Technical Education (CTE) courses in high school are linked to greater engagement, development of workplace skills and application of learning in and out of the classroom as students are determining the path for the future. Career and Technical Education is not a new concept and has been a part of education for some time.

Current Understanding of CTE

The scope of CTE often begins as exploratory in middle school, followed by expanded programs that transcend high school into post-secondary. Courses include commonly known areas of business, marketing, information technology, family consumer science, agriculture, construction, manufacturing and health science. CTE is not determined by the name of the course, but rather the content standards that guide teaching and learning. The standards are founded in knowledge and skills, core workplace competencies and specific skill competencies associated with the career area (Scott & Sarkees-Wircenski, 2004). Through CTE students participate in rigorous and relevant curriculum that transfers core academic skills to tasks in real life.

According to Levesque, Laird, Hensley, Choy, Cataldi, and Hudson (2008), the “majority (88 percent) of public high schools offered at least one occupational program in

2002, either on or off-site” (p. 8). Occupational program types similar to the 16 cluster model, specifically areas such as Agriculture, Business, Marketing, Construction, and Health Care were all included in the offerings of public schools. In 2002, Levesque, et.al., states public schools averaged nine occupation program offerings for student participation.

According to the Nebraska Department of Education, Career Education division 2016-2017 outcomes and insights, every public high school in the state of Nebraska offered CTE courses. Over 98,000 students in grades 7 – 12 participated in earning at least one credit during the 2016-2017 school year and on average participated in 5.5 CTE classes during the high school experience.

CTE programs are most commonly implemented into the high school experience in one of three ways: 1) course offerings within the school; 2) specialized programs off-site or shared-time centers; and 3) stand-alone CTE schools.

- 1) Offering CTE programs on site makes the courses an integrated part of the adopted curriculum and day-to-day school environment. Students are enrolled in the traditional core academic classes required for graduation; however, they also have the opportunity to choose from various career related electives.

These electives are open to students to enroll in based on area of interest or personal career aspirations. The CTE programs implemented in this way are a part of the comprehensive high school setting.

- 2) Specialized programs off-site continue to provide students the opportunity to select courses of interest while also meeting the needed core academic graduation requirements. With an off-site implementation, students often

complete the academic course requirements in the traditional high school setting, but travel to an alternate location for the career technical instruction. Off-site implementation programs do not offer academic courses within the alternate learning environment. These off-site programs tend to serve students from multiple traditional high school settings and are therefore also referred to as shared-time centers. It is common for these shared-time centers to be at a district or even regional level. (Levesque et al., 2008; Tews, 2011).

- 3) The stand-alone CTE program model offers both academics and CTE, similar to a comprehensive high school. Of the more than 21,000 public high schools in the United States, over 1,400 of them are known as stand-alone career technical high schools (Neild, Boccanfuso & Byrnes, 2015). The difference between a stand-alone CTE program and a traditional high school comes in the focus of instruction. The stand-alone CTE program has an intentional focus on the career technical instruction and skill development throughout all aspects of the student's experience. Academics are taught, but it is through the context of the chosen career pathway. These sites offer a natural opportunity to develop curriculum integration defined as "another way to teach concepts so that students see their application in multiple contexts" (Stone, Alfeld & Pearson, 2008, p. 5; Tews, 2011). It is also common for stand-alone CTE programs to extend beyond high school and offer services to adult students as well (Levesque et al., 2008).

Course offerings within the school, specialized off-site programs and stand-alone CTE schools could incorporate career academies adding another layer to the experience.

These academies provide specific career related experiences to a designated cohort of students and focus on college and career readiness. In order to be considered a career academy, the experience must contain three key components: small learning community, college preparatory curriculum with a career focus, and an advisory board to provide the voice of community, employers, and post-secondary. The National Career Academy Coalition (2017) currently estimates the existence of 7,000 career academies which serve 1 million students.

No matter the model of implementation or physical location of the CTE program, educational leaders determine the specific course offerings available for student participation. These opportunities allow CTE to be flexible in meeting the specific needs of a given community in developing a workforce that is prepared for future, as well as students capable of succeeding in the post-secondary arena.

Seen as programs that provide varied opportunities for student learning, it is important to understand the origins of CTE and how it has transitioned from vocational education. The name has changed, but the perceptions of the past continue. Support must come from communities and educational leaders who understand the progression from vocational education to career and technical education. The decision to offer CTE programs must represent the very community it serves.

History of CTE

CTE is not a current educational trend, nor is it new to education. The inception of CTE dates back to 1971, while the urging of name recognition did not become common place until around 1998 (Finch & Sheppard, 1975; Castellano, Stringfield & Stone, 2003). The idea of developing knowledge and skills that lead to future goals is the

underlying premise, and although not referred to as such, vocational education existed before formal public education.

The early education of children to be prepared for the transition to adulthood was the beginning of vocational education. The practice of children learning from parents, through both observation and doing, are the true beginnings. Such educational experiences served the personal welfare of the student and the environment in which they lived.

Society began to change and the need for formal education was evident. This formal education came about as a free public education for all. One intent of free public education was to bridge the gap between education and the economy. Public school was an environment in which all citizens could be educated for their personal welfare and the economy to which they would contribute (Alexander & Alexander, 2012). Schools looked at the student and saw the economic benefit to society for the student to be prepared for a chosen path. Students who were educated with desired skills were beneficial to society through the positive economic impact of providing needed products or services. The public education system focused on the needs of a community and developed programs to teach students the skills and abilities to address these needs.

In the early history of education, parental instruction and student observational experiences were appropriate as society was largely agricultural based. These instructional practices worked well with the needs of those working on the homestead. After 1820, education began to change in response to the needs of the community it served. A more formal and organized process was of greater interest and resulted in two education tracks: future professionals and workforce (Help Wanted, 2005; Barlow, 1976).

Students bound for professional areas of work continued formal education after the eighth grade, while those entering the workforce participated in apprenticeships or specialized training to develop specific trade skills.

As society further advanced, and the Industrial Revolution emerged, education once again responded. Maintaining the emphasis on the development of professionals, but transitioning education for the workforce became crucial. It was necessary for schools to develop workers who were less specific craftsmen and more machinist to increase efficiency and productivity (Hoffman & Hoffman, 1976). Although different in approach, both educational tracks educated students who could ultimately contribute to the economic well-being of the community.

Still not directly referred to as vocational education, the processes and expectations were taking shape. Miller (1984) points out that although education was open to all during the beginning of the 20th century, the educational system was not meeting the needs of many. The professional track and workforce track were seen as detached within the education system developing a clear separation in educational needs and resources. Legislation began to address these concerns as well as recognize the need for continued advancement.

Emphasis Through Legislation

The first significant definition and reference to vocational education occurred in 1917 when the Smith-Hughes Act was signed into law. As part of the public education system, vocational education was supervised and controlled with the purpose to fit students for employment. Employment status was for those over the age of fourteen preparing to enter the workforce and having developed skill for useful employment

(Finch & Sheppard, 1975). The Smith-Hughes Act outlined the vocational programs, procedures, and skills-based training that could be supported with designated federal funding (Hyslop-Margison, 2000).

Although an important advancement in terms of providing vocational education to students, the divide between students based on career trajectory became deeper. Specific funding was now available to develop programs that would guide students considered non-academic into a trades track. Per Hanford (2014), the Smith-Hughes Act went so far as to “explicitly describe vocational ed as preparation for careers not requiring a bachelor’s degree” (para. 7).

While traditional education focused on reading, writing, and arithmetic, vocational education was intended to prepare students for the workforce. Specific students who needed to learn a trade or exact skill set were trained only for that. Although still required to be a part of vocational education, academics were not seen as a high priority in the curriculum. With the newly designated funding and recognition as vocational education, the tracks further expanded the two different systems of education: one for the intellectual focused on academic development and one for the underachiever focused on trade skill development. Vocational education now existed and became a place for students who were deemed the doers, not the thinkers (Help Wanted, 2005).

Over the next several decades additional legislation was passed and national reports surfaced as the interest in vocational education saw a system of ebb and flow. Each of these enactments had a lasting impact on the formation of vocational education through altered definitions, focus areas, as well as more clearly allocated federal dollars for specific goals within the program.

Vocational Education Act of 1963. This act included expansion of vocational education to all, specifically addressing funding for disadvantaged and disabled students. Funding formulas of this act were not addressing fields of study, but rather student populations. Schools were able to utilize funding for programs which served high school dropouts through area vocational schools. Requirements included a specified percent (10%) of federal funds to support experimental programs and research for disadvantaged students (Imperatore & Hyslop, 2017).

Carl D. Perkins Vocational Education Act of 1984. This initial Carl D. Perkins Act continued the funding focus on special populations as established in act of 1963; however, additional populations were designated to attempt the elimination of bias based on gender or stereotype (Imperatore & Hyslop, 2017). Students considered non-traditional for the given career field were beneficial to include in the vocational education programs.

Carl D. Perkins Vocational and Applied Technology Education Act of 1990.

This subsequent act to the 1984 act, started the academic integration with vocational education, post-secondary articulation and industry partnerships. Tech Prep was introduced and required a commitment spanning two years in both high school and college to complete an articulated plan of courses. Funding was reallocated to focus more on the impactful pieces of the program versus only special populations and reduced funding directed toward management. A final component of this act revolved around accountability. States would now be required to measure performance of programs through development and implementation of standards (Imperatore & Hyslop, 2017).

School-to-Work Opportunities Act of 1994. This act engaged business and industry in partnership with schools to provide work-based learning experiences that were directly connected to school-based learning. Although not required, the act encouraged the development of academics in a career area which articulated to some form of post-secondary opportunity (Imperatore & Hyslop, 2017).

Carl D. Perkins Vocational and Technical Education Act of 1998. This 1998 reauthorization of the act maintained the previous acts efforts in alignment of CTE at the high school level to post-secondary and academic integration in CTE courses. The Tech Prep initiative was also expanded. Once again, the act adjusted the percentage allocations allowed for spending, as well as the dollars associated with special populations. Requirements were now placed on funding being used specifically for technology, professional development, post-secondary articulation, and academic integration. The accountability piece of this legislation was also significantly changed with required reporting of indicators in the areas of academic and technical skills, credentials, placement and retention, and participation and completion of non-traditional students. The government also now had the ability to withhold funding for programs that were not performing adequately (Imperatore & Hyslop, 2017).

No Child Left Behind (NCLB) Act of 2001. As an update to the Elementary and Secondary Education Act, NCLB initiated new academic accountability requirements in efforts to guarantee the opportunity for all students to get a high-quality education as well as increase student academic achievement (Blowe & Price, 2012). Although these requirements did not specifically pertain to

performance in the CTE classroom, they did have an impact. The NCLB focus on meeting academic proficiency levels for all students included harsh sanctions for those not meeting progress toward goals. Such legislation focusing on academic standards impacted CTE through decreased enrollment numbers, as well as cuts of high school CTE programs to offer additional or remedial academic courses (Imperatore & Hyslop, 2017; Blowe & Price, 2012).

Carl D. Perkins Career and Technical Education Act of 2006. With the passage of NCLB legislation, this reauthorization of Perkins was focused largely on academic achievement. As part of this focus, the concept of programs of study were instituted. Any school that was to receive funding was required to offer at least one program of study where courses were aligned with academic standards at high school level and articulated with post-secondary programs (ACTE, 2006; Giani, 2017). Requiring more of a connection to the academic standards and the CTE classroom was in direct response to the declining opportunities seen after NCLB was implemented.

Every Student Succeeds Act (ESSA) in 2015. As the next reiteration of the Elementary and Secondary Education Act, ESSA replaced NCLB as the accountability measure for schools. Continuing to maintain a focus on academics, ESSA moved the control back to the state for educational components such as assessments, teacher evaluation and standards. Along with this new authority, school districts have greater input and opportunity for application of federal dollars. ESSA does not lessen the need for rigorous academic standards; however, required states to align academic standards with state CTE standards and post-

secondary education (Coppes, 2016; Malin, Bragg & Hackmann, 2017; NDE, 2016).

As legislative actions have occurred, differences are seen in the specific requirements to funding capabilities. The changes in funding are a response to what is happening within communities and what is required to meet the workforce needs. Developing legislation that benefits all students and provide educational opportunities in career development can assist in meeting these needs. Beginning with the Smith-Hughes Act, CTE has seen consistent support from the Federal level as reauthorizations continue to exist in current legislation.

Transition Vocational Education to CTE

As the passage of legislation regarding vocational education took place, educators saw adjustments made in response to the changes in society and need for education to keep current. The next step in this evolution is the rebranding of vocational education with a new focus and a new name: Career and Technical Education (CTE). “This transition was more than a name change; it represented a fundamental shift in philosophy from CTE being for those who weren’t going to college to a system that prepares students for both employment and postsecondary education in the dynamic world economy” (Ruffing, n.d., p. 3).

Literature shows varying insights into this transformation. Grounded heavily in the ideas of vocational education and preparing students for the future, Finch and Sheppard (1975) claim that CTE is not vocational education. Definitions of vocational education have varied with influences throughout the years. The changing definition leads to the belief that vocational education is actually a part of career education;

however, career education encompasses more. One fundamental support for this idea is in the learning activities, as defined in CTE, that exist beyond a single job. Vocational education was to prepare a single student with the specific skills needed for a particular job. The philosophy behind CTE are activities that range from exploratory, to basic skill development to a professional career pathway while increasing self-awareness and individual choice for education and training (Finch & Sheppard, 1975).

Figure 4 references the specific differences of vocational education and CTE as outlined by Nebraska Career Education (NCE). NCE sees this as a transition rather than vocational being a minor part of CTE. The transition has expanded to include all students, not just those on a career trajectory, and identified additional career pathways. In contrast to vocational education, CTE aligns materials to academics, rather than being seen as alternative, and also expands beyond the high school environment.

Vocational Education vs. Career and Technical Education	
For a few students	For all students
Focused on a few jobs	Focused on careers
6 to 7 “Program Areas”	16 Clusters – 81 Pathways
In-lieu of academics	Aligns/supports academics
High school focused	High school & college partnerships

FIGURE 4: Vocational Education Characteristics versus CTE Characteristics

Unlike vocational education, CTE is more than preparing students for a single job/occupation or specific trade, it is opening doors to opportunities after the formal education ends. According to the 2006 Carl D. Perkins Career and Technical Education

Improvement Act, CTE “provides technical knowledge and skills aligned with academic standards that are needed to prepare for further education and careers in current or emerging professions” (Levesque et al., 2008, p. 1).

In addition to the integration of academic learning and skill development, CTE reflects the concern for how education affects the whole of life. Acknowledging the connection between education and employment CTE goes beyond developing producers in the economy, to include other roles as global citizens, families, consumers, and individuals (Finch & Sheppard, 1975).

As CTE takes shape the separate learning tracks for students as professionals and students as today’s workforce is no longer the guiding philosophy. Society is calling for graduates who are both college and career ready, not a system that requires them to choose one or the other. Students possess the knowledge and skills to choose a path beyond graduation that is based on personal interest, ability, and educational coursework. Continuing to educate students with the intention to contribute to the economy, CTE adjusts the education to meet the needs of society.

Value of CTE

With the enactment of the Every Student Succeeds Act (ESSA) and the focus to ensure students are college and career ready upon high school graduation, leaders (both state and national) are seeing the possibilities that exist in CTE to transform learning. ESSA provides the platform for districts and schools to shift from the components of academics assessed through standardized tests and graduation rates of No Child Left Behind to the education encompassing the whole student (Coppes, 2016; DeWitt, 2008). CTE must still combat the lingering perception of what CTE is in relation to what

vocational education was. Public opinion regarding CTE often refers to the idea that curricula in programs is less rigorous and targeted to students who are categorized as low-achievers and disadvantaged (Giani, 2017). Based on public perceptions the question remains, what value does CTE bring to schools and students?

Evidence does exist to support the value CTE adds to student achievement, student retention, and overall student motivation. Gottfried and Plasman (2017) has identified three areas where CTE adds value in regards to student high school completion and college enrollment: Skill Building, Engagement and Relevance.

Skill Building. Skill building initially relates to specific career related requirements needed for success in that particular career area; however, it goes beyond these specifics to universal employability skills. The National Association of Manufacturers (NAM), as reported in DeWitt (2008) refers to employers concerns of skills lacking in potential hires employability habits. According to NAM, employees do not possess needed critical thinking, reasoning, problem-solving, timeliness and collaborative skills to be successful in the world of work (Gottfried & Plasman, 2017; DeWitt, 2008). CTE courses incorporate such employability skills as part of the content standards, but also through additional learning activities such as internships, job shadowing, mentoring, work-based learning and career academies.

Engagement. Engagement of students is a focus of all schools. Although difficult to define, Neild, Boccanfuso and Byrnes, state engagement is “demonstrated, at a minimum, by attending school and accumulating at least some course credits” (p. 3, 2015). Students who have a connection with the school and course materials in which they are learning want to be present in school. Research shows that students who

regularly attend school or are more engaged are more likely to graduate on time.

Engagement directly aligns with efforts to keep students in school lowering the dropout rate.

Engagement through CTE courses is seen as moving students from the theoretical to more abstract. Student experiences in CTE classrooms and learning activities are more hands-on which forces students to apply content to real-world problems using developed communication and analytical skills being asked for by employers (Gottfried & Plasman, 2017; Tews, 2011). Providing an environment for students to actively participate in learning where knowledge and skills are applied, not just talked about, stimulates the motivation of some students to stay in school.

Student success characteristics are also measures of school engagement. Common student success characteristics include attendance, on-time graduation, grade point average and potential future earnings. Nebraska Career Education student outcomes from 2016-2017 report 99% of CTE concentrators as high school graduates, compared to the state graduation rate of 89% (NDE, 2016).

Research shows the importance of the overall impact of CTE, specifically programs of study, on a student's grade point average and on track graduation. Results from a longitudinal study published in 2012 appear to support differences that are not significant in students involved in CTE and students not involved in CTE. Further analysis of the research shows that initial conclusions based on minimal one-year data of 9th graders and grade point average is not significant, but evidence supports significant positive differences in the cumulative 9th and 10th grade GPA. Students who are engaged in the early high school years, continue to increase cumulative unweighted grade point

average which is directly tied to maintaining on track status for graduation (Castellano, Sundell, Overman, & Aliaga, 2012).

Relevance. As a result of being present and actively involved, students see relevance to what they are learning. Relevance of CTE content is essential. The formal curriculum adopted by a school or district is an extremely important facet of the high school experience. “The high school curriculum can be viewed as a socially structured set of opportunities and constraints. An individual course may represent an opportunity for inspired learning, establishing social connections, boredom or discouragement” (p. 345, Plank). The make-up of all classes that students participate in help to determine the path following graduation. High school CTE courses grounded in content as it directly relates to one future develops the relevancy need by students to answer the question, why am I learning this? (Gottfried & Plasman, 2017).

CTE and Academics. With the emphasis placed on aligning CTE content and learning activities with academically challenging coursework, Perkins IV legislation lifted the expectations for student achievement of those participating in CTE (Gottfried & Plasman, 2017). The days of teaching in isolation in the CTE classroom were replaced with the efforts to provide learning opportunities that applied academic knowledge to competency based CTE ideas to create an environment of critical thinking.

Specifically the core academics of math and reading are studied and reported to represent the work initiated through Perkins IV. Often referred to as numeracy and literacy integration in CTE, studies show a statistically significant difference in pass rates of CTE participants. Nebraska reports 75% of CTE concentrators passing statewide

English assessments. CTE students have higher rates of enrollment in both honors and AP courses compared to non-CTE students (NDE, 2016).

A study conducted in Virginia in response to the fear associated with NCLB and the emphasis on academics provides various points of emphasis for the connection between CTE completers and academic achievement. In the curricular area of reading, CTE completers pass rates on state standards of learning assessments overshadowed the rest of the students by at least 3% points. Specifically, in 2008 CTE completers had a mean pass rate of 97.53 compared with non-CTE participants mean of 90.39. While in the curricular area of math, even greater gains were reported. During a three year period, CTE completers showed pass rates of 7% to 10% higher in math than the rest of the state for two of the three years. Additionally, during the 2009 and 2010 academic years, a mean pass rate of 97.86 and 97.61 respectively were reported CTE completers. In contrast to non-CTE participant mean pass rate of 88.53 in 2009 and 88.83 in 2010 (Blowe & Price, 2012).

As Perkins IV emphasized the alignment of content in CTE courses with the academic standards, CTE teachers developed a sense of uneasy in the shift of their own content knowledge. One approach that lessens the apprehension is the concept of curriculum integration. The premise behind this integration is for students to apply the concepts of one area in multiple contexts. A study conducted by Stone, Alfeld and Pearson (2008) involved intervention with the CTE teachers to develop pedagogy in teaching integrated curriculum. The CTE teachers worked closely with math teachers to align math instruction into designated CTE courses. Specific research questions involved achievement of participating students on traditional math test (TerraNova), college

placement (Accuplacer) and applied math test (WorkKeys). Although not expected, the intervention of math instruction did show increase of student scores for both the traditional math test and the college placement, but not the applied math test. Providing a contextual environment for students to learn math, rather than remedial course, appeared to have a significant positive effect on traditional and college placement assessments.

Current Perkins legislation requires greater accountability for a school's integration of math, literacy, and career and technical education courses. States must supply supporting documentation for receiving Perkins funding, and this documentation is tied to proficiency of students in academic content and career specific content. A connection of proficiency can not be measured on an academic test. States must show evidence of cross-walked standards which link CTE content standards with core academic standards (Often, 2011).

The integration of academics in CTE courses provides an arena for students to apply the concepts to a chosen area of interest. Students are more engaged in content due to the relevancy of material with real-world scenarios. Assessments utilized within the CTE classroom build upon an environment and learning process that is authentic. These assessments can even be tied to specific workplace certifications. The classroom engagement and ability for students to experience the connection between classroom content and career opportunities lead to increased attendance as they can see the personal future goal (Association for Career and Technical Education, 2008b; Hooley, Marriott & Sampson, 2012). In addition to the relevancy of future endeavors, some believe that courses joined by choice and of interest to the student can act as a motivator for a student

to endure the monotony of required academic courses in order to reach the enjoyment of the CTE course as part of the school day (Neild, Boccanfuso & Byrnes, 2015).

Economic Impact. It is estimated that immediately following high school, at least forty percent of students seek full-time employment rather than enrolling in post-secondary education. Based on this statistic, it is important to realize that for this segment of students, high school may be the only opportunity they have to develop employability skills and knowledge. Non-college bound students who participate in CTE courses with an emphasis on particular career or program can increase earnings by 20% in the year after high school (Bishop & Mane, 2005). Employers know that it takes time and money to train workers. Therefore, they want an employee pool that consists of workers who already possess required knowledge and skills. By participating in a focused CTE program during the high school experience, those graduating who are non-college bound have a higher earnings potential than non-CTE participants.

Other benefits exist to CTE participation and being college and career ready. As society has shifted from agricultural to industrial to transformational, so have the economic advantages for educated members of our society. Castellano, Stringfield & Stone (2003) states that the “differential economic advantage of obtaining a college education in comparison with dropping out of high school today is more than four times as great as it was 30 years ago” (p. 239). This advantage is even more evident as higher paying jobs are requiring additional education post high school.

For those going on to post-secondary education, CTE participation can limit the amount of time and money required to determine a path. Rather than attending a community college or university to figure out a future path, CTE participation that begins

as exploratory in middle years and leads to pathways in the high years can greatly impact the cost of obtaining the post-secondary education (Reese, 2005).

As educational leaders are making decisions on program and opportunities to provide to students, it may not be enough to focus on just academics. A need exists to continue the focus on bridging the gap with the economy and education. Providing opportunities that extend from the first days of school through post-secondary and into adulthood to develop contributors to society through many factors (Finch & Sheppard, 1975).

Post-graduation Articulation. Required through Perkins IV legislation and the development of programs of study, CTE has established links for secondary to post-secondary through opportunities of dual and concurrent enrollment (DeWitt, 2008). Such articulation provides a clearer path for those who may not have planned to go on to post-secondary education initially. Nebraska utilizes programs of study to frame the CTE course offerings. As a result, 70% of CTE concentrators go on to post-secondary education (NDE, 2016).

These programs of study span a continuum of learning from career exploratory, possibly at the middle school level, to introductory experiences and ending with capstone experiences. These capstone experiences are often licensure, industry credentials or degree attainment. As seen in Figure 5, districts utilize the United States Department of Education program of study framework that includes the ten essential components clearly outlining the connection of high school education to college and career readiness (NDE, 2014).

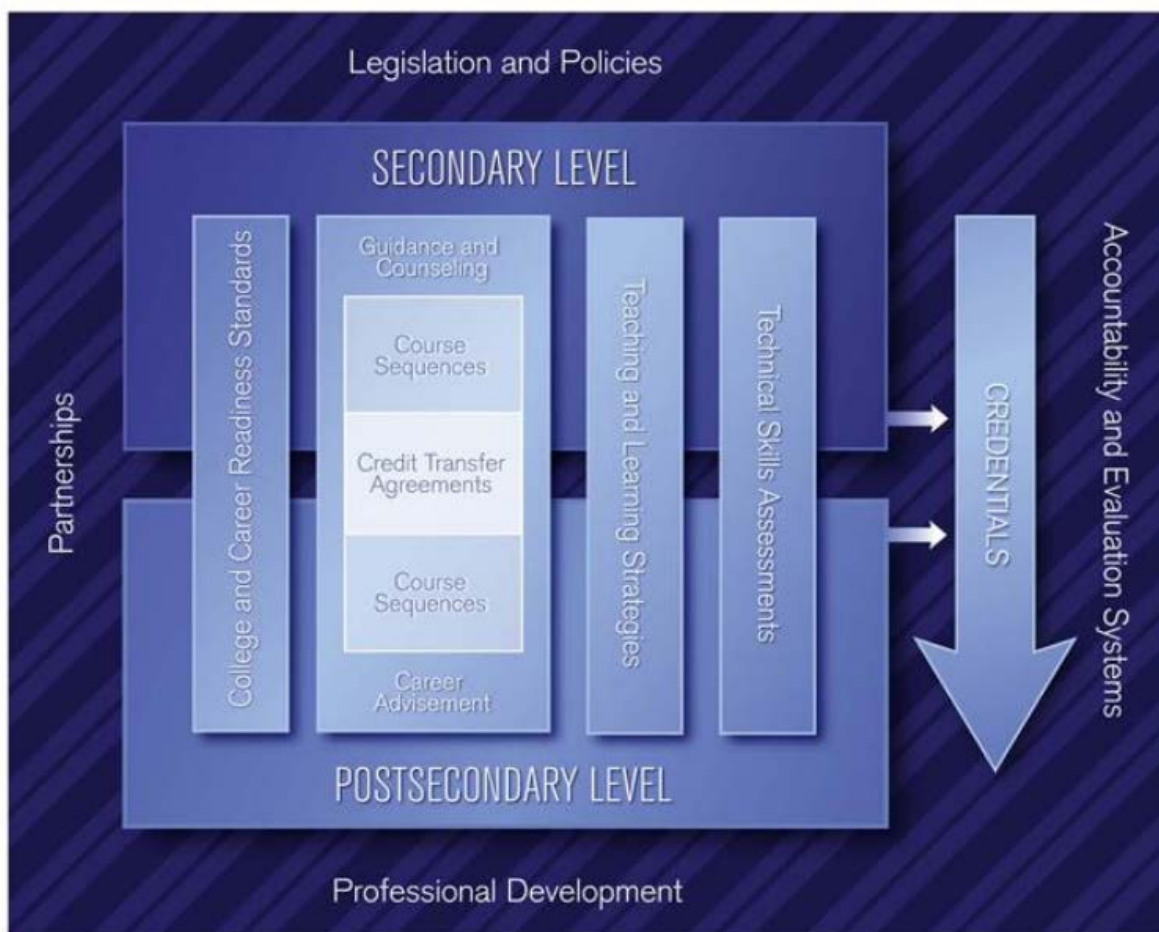


FIGURE 5: Program of Study Design Framework Reprinted from NDE, Programs of Study, retrieved from https://2x9dwr1yq1he1dw6623gg411-wpengine.netdna-ssl.com/wp-content/uploads/2017/07/Section5_ProgramsOfStudy.pdf

Developed CTE programs of study provide a clearly articulated path for post high school opportunities integrated into the high school experience. In efforts to devise state plans to address ESSA, the use of programs of study developed around the national framework does not require school districts or states to start from ground zero.

The goals and freedom presented to states through ESSA to more fully encompass the learning of the whole child, as well as continued support of Perkins authorization, is

seen in the 10 components of the program of study framework (see Figure 6). Schools with programs of study in place and developed through the approved model have the upper-hand in developing state ESSA plans to address college and career readiness. The framework outlines what should exist in each of the essential components that combine to develop the of programs of study implemented within Nebraska's CTE programs (NDE, 2014).

In addition to programs of study, literature shows various states enacting requirements for students to complete an individual learning plan that outlines the steps to reach graduation. Kentucky requires this plan to emphasize both academic and career development based on the individual interest of the student. Developing such a plan allows for more targeted college and career guidance that provides a defined path through high school to post-secondary and/or the workplace (DeWitt, 2008).

10 Essential Components

1. Legislation and Policies
2. Partnerships
3. Professional Development
4. Accountability and Evaluation Systems
5. College and Career Readiness Standards
6. Course Sequences
7. Credit Transfer Agreements
8. Guidance Counseling and Academic Advisement
9. Teaching and Learning Strategies
10. Technical Skills Assessments

FIGURE 6: Programs of Study 10 Essential Components Adapted from NDE, 2014.
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Not all research supports the value of CTE in schools. Some opponents to CTE continue to see the curriculum as “watered down” or less rigorous and only for those considered non-academic. CTE is seen not as a path for those going on to four-year or two-year educational opportunities following high school. In support of this side of the

argument, some studies have shown the benefits only exist for students at-risk for dropping out of high school. This supports the idea that graduates going on to post-secondary opportunities do not benefit from participation in CTE, but see more advantage in completing additional core requirements during the high school experiences. Little difference in CTE participants and non-participants exists in the achievement of students considered academic or college-prep.

Accountability Measures

Through NCLB an emphasis at the high school level was placed on academic test scores and graduation rates. These measures also appear in some definitions of college readiness when looking at how prepared academically graduates are for the next level (Malin, Bragg & Hackmann, 2017). A school is ranked as successful, or not, based on the overall graduation rate and overall academic test scores of its student population. While individual student performance and success is measured through cumulative unweighted grade point average and attendance. Common school and student performance measures provide limited insight into the path students take after graduation or the skills and abilities that students possess.

School Graduation Rate. Graduation rate is calculated using a four-year cohort and is based on standards as outlined by the US Department of Education. The rate is “calculated by dividing the number of students in a cohort who graduate with a regular high school diploma in four years or less by the number of students in the Graduation Cohort, including students who graduate in the summer of the Expected Graduation Year” (NDE, 2017, p. 1). Figure 7 shows the specific formula utilized by the state of Nebraska for four-year cohort graduation rate.

<div style="border-bottom: 1px solid black; margin-bottom: 10px;"></div> <div style="text-align: center;"> <p>High School Diploma Recipients (YEAR X)</p> <p>FIRST-TIME ninth graders [(YEAR X) – 4] + (transfer in) – (transfer out)]</p> </div>

FIGURE 7: Cohort Four-Year Graduation Rate Formula

Graduation rates and dropout statistics are monitored closely by school districts throughout the country. Previous studies have shown varying results in terms of CTE and graduation rates – some showing a positive relationship, some showing a negative relationship and others showing no relationship at all.

Research conducted by Plank and the National Research Center for Career and Technical Education (2001) showed a connection with CTE, academics, and student retention. The opportunity for students to see the relevance in the academic content through the CTE course provided students the link to stay in school. Further study supported a ratio of CTE courses to academic courses impacting student retention. Specifically showing that one CTE course for every two academic courses provide the lowest risk for students in regards to dropping out of high school. Any amount below, student taking no or few CTE courses, and any amount above, students overloading their schedule with CTE courses, implied an increased risk of dropping out. The National Research Center for Career and Technical Education also believes the probability of keeping students in school increases with the number of CTE courses, and adds special notice for lower-ability learners. (Plank, DeLuca & Estacion, 2008; Reese, 2005).

Another study referenced by Todd (2014), showed CTE programs in Arizona were having a positive impact on the dropout rate for students enrolled in two or more CTE courses. The connection between participation in CTE courses and staying in school is a fine line. Students, through the assistance of career guidance, must find a balanced combination of courses to meet their learning needs.

Students participating in CTE also show higher rates of graduation when viewed comparatively to non-CTE participants. The average rate of graduation for students participating in CTE courses to graduate with their cohort is 96%, whereas the average rate for the non-CTE cohort is 87%. Diving deeper into the student characteristic, CTE completers/concentrator, those taking at least three CTE semester-courses throughout their academic career within a particular Career Education program of study (NDE, 2014), achieve mean high school cohort graduation rates 6% to 13% higher than non-CTE students (Blowe & Price, 2012).

Along with participation in CTE courses or programs of study, benefits to students are being researched throughout the various aspects of CTE. For example, Reese (2005) refers to the possibility of students to persist through high school if involved in a career academy model of CTE implementation. Based on the small learning community concept, students enrolled in career academies are 2.5 times less likely to drop out. While students in other implementation models that participate in work-based learning activities saw a 30% decrease in likelihood of dropping out.

Academic Test Scores. Measurement of school success through student performance is linked directly to academic test scores. Whether national, such as SAT or ACT, or state assessments instituted by schools as required by legislation, the tests are

intended to provide a measure of a school's academic programs. Upon NCLB and the required proficiency levels by year, as well as the harsh sanctions for not meeting adequate progress, schools placed an emphasis on each student's academic performance (Imperatore & Hyslop, 2017). Students are required to be at a specified proficiency level in writing, English, math and science with scores aggregated to provide an overall score of the school itself. Although the individual state tests may be different, the idea of all schools being compared on the basis of student academic proficiency became the measure on which to focus.

Student Cumulative Unweighted Grade Point Average. From an individual student perspective, grade point average is used as the most common measure of success in high school. Cumulative unweighted grade point average is used to rank the members of a class from highest to lowest, with the assumption that those ranked higher may be more successful. GPA is requested from post-secondary institutions to determine eligibility for acceptance, not only into the institution, but even degree programs within the institution. Employers also inquire about GPA for new hires in hopes of determining the connection to possible career success. GPA which is built from grades representing individual course performance is assumed to be an indicator of academic achievement (York, Gibson, & Rankin, 2015).

Standardized assessments and consistent calculation of graduation rates allows for an overall measure to determine success of schools in educating students. Research shows students entry into post-secondary or career, but little to follow students through the experience. Although impossible to prepare for every possible avenue, it is possible to prepare students for college and career.

With the passing of ESSA and the requirement for states to determine how to align standards with college and career skills, it is necessary to review accountability measures for reporting purposes. States are grappling with a way to define college and career readiness as well as the appropriate measures for effectiveness (NDE, 2016; Malin, Bragg & Hackmann, 2017). Common school and student performance measures are not enough to meet the requirements put forth in ESSA; therefore, many states are searching for additional measures for schools around the whole student experience and specifically being college and career ready.

New Influence. According to the Expert Workgroup on Accountability, schools wanting to produce students who are college and career ready should implement recommended measures to move them forward. “What’s measured gets valued by schools, but most state accountability systems today don’t measure or value career readiness” (p. 1). Previously states attempted to measure college and career readiness by using common student and school success factors that may not provide an accurate picture.

As illustrated in Figure 8, recommendations for college and career ready measures are divided into four categories: 1) progress toward post-high school credentials; 2) co-curricular learning and leadership experiences; 3) assessment of readiness; and 4) transitions beyond high school.

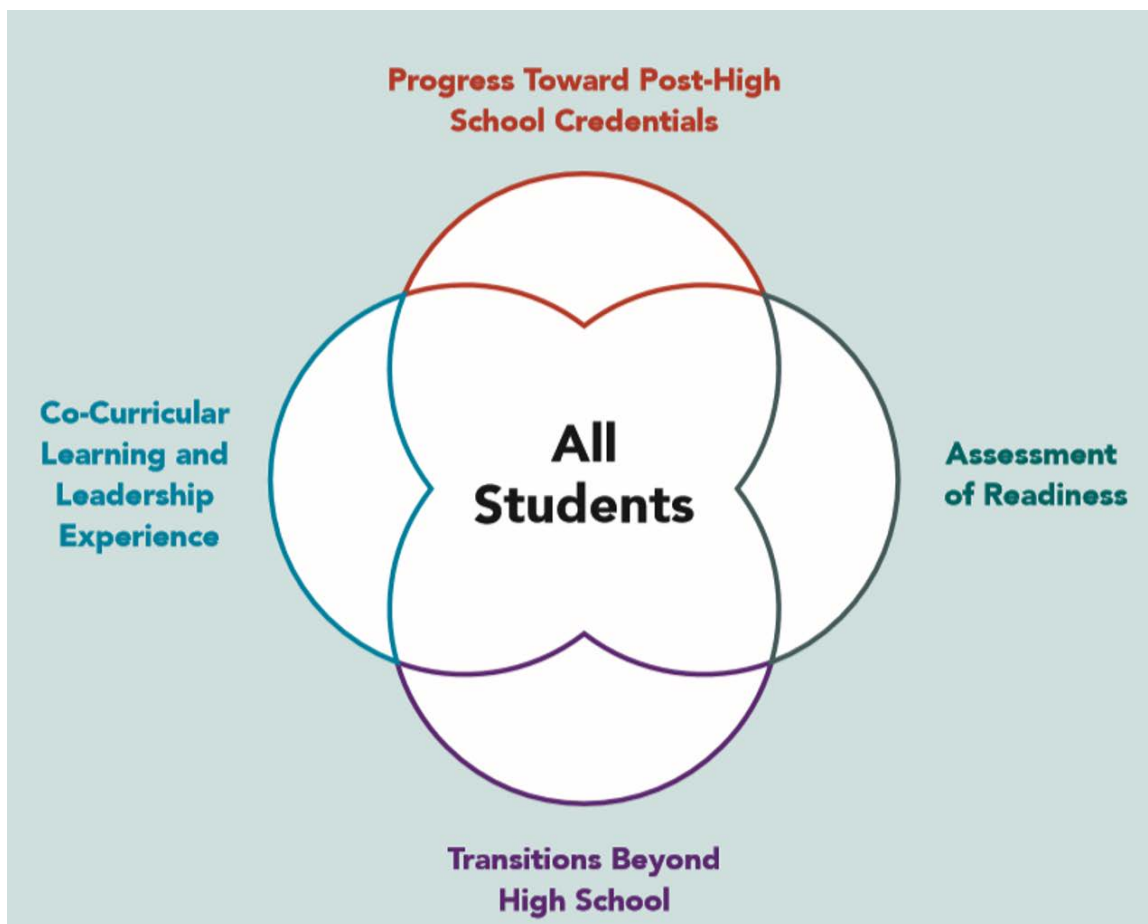


FIGURE 8: Measuring College and Career Readiness for All Students

Reprinted from Council of Chief State School Officers & Education Strategy Group, Expert Workgroup on Accountability. (2017).

Progress Toward Post-High School Credentials. This category refers specifically to the value add for paths beyond high school. Areas within this measure could include the attainment of postsecondary credit while still in high school or completion of a licensure program valid immediately in the specified career path.

Assessments of Readiness. Current practice includes setting a cut score on national or state assessments that may have no connection to college and career readiness. Expanding assessments to include other performance-based demonstrations provide a

more accurate picture of the knowledge and skills student may possess for transitioning to the next level.

Transitions Beyond High School. Schools often review a student's chosen path within months of graduation via survey. Greater emphasis should be placed on follow-up of graduates to gather data around successful student transitions. Students who are enrolling in higher education and not requiring remediation or employment in a high demand career field provide insight into the actual content that may be present in high school courses.

Co-Curricular Learning and Leadership Experiences. This measure includes student participation in more than just coursework, and extends to the application of content. Students are evaluated on the professional knowledge and skills they have gained and demonstrated through real-world opportunities.

Developing a system in schools to integrate these categories falls in-line with the philosophy of career and technical education encompassing components of the framework for programs of study. An overview of CTE in the United States, last published in 2008, reiterates the opportunities that exists in schools currently. Specifically noting that in 2002, 88% of public high schools offered some form of CTE program either at the school or off-site (Levesque, et al., 2008). With such a large percent of schools already providing programs that lay the groundwork for each category, determining specific measures that can validate the student's skill and preparedness upon graduation seem to be the next step.

CTE and College and Career Readiness

College and career readiness is difficult to define. States have struggled with what it means to produce college and career ready graduates as well as the appropriate measures for determining success. Definitions have been approached differently in each state, some focusing on standards and course requirements, others assessments. While another approach is through descriptions of knowledge and skills required of students (Bloom, 2010).

Conley (2012) defines a college and career ready student as one “who can qualify for and succeed in entry-level, credit-bearing college courses leading to a baccalaureate or certificate, or career pathway-oriented training programs without the need for remedial or developmental coursework” (p. 1). With this definition, what are the measures that can be used to hold schools accountable?

In recent years, accountability has centered around No Child Left Behind and the ability to meet Adequate Yearly Progress (AYP) standards. Determination of AYP has little to do with college and career readiness and more to do with performance on state mandated tests. As policy continues to move forward, the belief is that accountability at the federal level should provide a tool to schools to clearly measure college and career ready graduates and require clear and open communication of such to all stakeholders (Reinventing, 2010).

ESSA, however, has left the tool up to the state with the expectation of transparency in reporting. The Council of Chief State School Officers & Educational Strategy Group (2017) are beginning to report a shift as states begin to address the requirements of the Elementary and Secondary Education Act as revised in the ESSA.

States are exploring how to develop and integrate a broader range of measures for accountability including increased opportunities for students and reporting of college and career readiness.

In addition to an accountability measure for the performance of all schools, there is benefit to society in producing college and career ready graduates. A Workforce Development Education (2002) report from a Florida program emphasized the overall benefit to society of students who complete career education programs. Earnings for students continue to rise as specific training and education programs are completed, thus resulting in higher overall earnings and greater tax revenues and economic activity. Students who are more prepared for the future through skill development receive higher wages in relationship to the skill and thus have monetary means to contribute back to the economy. The range of education and certifications can begin with high school certification programs, continue through community college certifications, and be followed by varying degrees from associate through doctoral, with each degree resulting in the opportunity of greater earnings potential.

Student Intention Versus Reality

Preparing students for their future upon graduation can mean many different avenues. As Griffith and Wade (2001) reference, this preparation is an area where the public school system is lacking. Research in the early 1990's show 18 to 19 year olds made up the highest rate of unemployment. While those ages 18 to 25, who are employed, averaged six changes in employers or jobs. This gives the perception that schools are failing as students do not have a defined path immediately following graduation and instead are attempting to find where they fit into the employment market.

A study from the state of Maine shows insights into specific intentions versus reality of graduates in regards to college enrollment. Plimpton and Quint (2007) report that 64% of the states graduating class of 2001 intended to enroll in college upon graduation; however, a year following only 62% actually enrolled. In contrast, 2005 Maine graduate's intentions rose to 70%, while only 60% of them actually enrolled. According to reported numbers the intentions for students to pursue post-secondary education was high, but a year follow-up shows conflicting evidence in the reality.

Recommendations from the Mitchell Institute provide ways to decrease the differences revealed in intention versus enrollment of the Maine graduates. These recommendations begin with high expectations for all students, which are reflected in high school graduation requirements and include dual-enrollment opportunities. Second, career exploration plays a vital role and should not be overlooked during the middle school years. Connecting personal interests to future opportunities assists in creating a 4-year plan for high school course selection and rigor. Next is providing the college experience. Engaging students in tours, visits, or other college campus experiences makes the possibility come to life. Those who never thought of college as an option now have a frame of reference. The final recommendation is to get businesses involved in education. Similar to the college experience, allowing students access to the workplace environment expands the knowledge of careers available to them and how they might fit in to this environment (Plimpton and Quint, 2007).

One 6-year longitudinal study looked specifically at the graduates in the class of 1993 that participated in career and work-oriented education programs versus those that were non-participants. Significant differences were found in the after graduation

successes, either college or career, of participants versus non-participants. Graduates who had not completed a career program were more likely to be employed in jobs considered to be temporary, rather than those leading to long-term career opportunities. These graduates also showed less overall employment during the six-year follow-up time. The same study revealed participants completing the career program had similar performance in common college outcomes. College grade point averages, time for degree completion, and the need for enrollment in remedial courses were all comparable across the participants and non-participants (Griffith & Wade, 2001).

Minimal research exists for how well schools are preparing graduates for future choices. Reports showing the connection between student preparation and future goals prior to graduation and entry into college or the world of work is even less. Instead, more emphasis has been given to the implementation and processes of school programs, rather than the success or failure of the graduates. Various factors can influence the decision of graduates regarding their future. Without knowing the personal motivations or items that may be out of their control when making the decisions following graduation, the numbers provide only a snapshot of school or program effectiveness.

Summary

Gaps continue to be prevalent in current literature regarding CTE. In 1976, Newell referenced the beginning of studies to support CTE. Studies were reviews of various implementation methods for newly developed tools, rather than the outcomes of the implemented tool. The need existed for more longitudinal research. When measuring the effectiveness of CTE, “the only really important and measurable outcomes of career education can only be realized as students progress in the work of work beyond high

school (p. 112). Although some longitudinal data exists today, there continue to be a need for such measurement in determining the effectiveness of CTE on producing college and career ready graduates.

A recent study introduced a next level CTE research focusing on not the “what” a student is enrolling in, but the “when”. Looking at whether the timing of CTE course enrollment has an impact on student achievement and college and career readiness, this study supported the notion that students who participate in an increased number of CTE courses have a lower chance of dropping out. However, an even stronger association was seen when the student completed the CTE courses during the junior and senior years of the high school experience (Gottfried & Plasman, 2017).

As with any educational program, CTE can not stand alone. It is not a single component that will reform education on its own. As Rhoades (2014) reminds educators, a majority of today’s students are preparing for jobs that do not yet exist. Remembering one intent of free public education, closing the gap between education and the economy, must be continued. Leaders are faced with determining if CTE is a piece of the educational system that can assist in bridging the gap by keeping students more engaged in school and increase the likelihood of graduation. Realizing that vocational education, initiated around low academic skill and low wage, is a thing of the past and measuring the value CTE adds to the student high school experience. Knowing that students who graduate are college and career ready will benefit all areas of the economy. It is not about just the path students take after high school, but what can be provided during the high school experience to better prepare them for this path.

CHAPTER THREE: Methodology

The purpose of this study was to determine the relationship between the intensity of Career and Technical Education experience and College and Career Readiness of high school seniors. This chapter outlines the participants, research design, data collection procedures, research questions, and data analysis used in completion of the study.

Study Design

This study data was used to determine the relationship between Career and Technical Education (CTE) intensity and variables of college and career readiness. The participants were divided into categories based on the number of unique, not required, CTE courses taken during their high school experience to determine intensity. Participant course history was reviewed and only elective CTE courses at each of the District high schools was included. To maintain a predictive learning environment, any required course was removed from the study to focus on the elective or choice option of course enrollments, as was any course taken through a stand-alone program that met outside of the seven high schools.

Student enrollment in elective CTE course offerings ranged from a minimum of 0 to a maximum of 24. To maintain sample sizes in each category of greater than 30 students, specified course numbers were combined resulting in 18 total categories. One category each for students taking 0 to 16 courses, with an additional category for those taking 17 to 24 courses. The higher the number of courses taken the greater the intensity of CTE.

The study's three dependent variables as a measure of college and career readiness were (1) attendance as measured by days absent during the high school experience, (2) cumulative unweighted grade point average and (3) post-graduation intent versus post-graduation position measured through responses to District conducted inquiry.

Participants

Participants for this study were part of a target population that met common characteristics as identified by the researcher (Creswell, 2012). Study participants were the 2016 graduates from a Midwest metropolitan school district. The sample (n=2092) was restricted to include only participants who were on-time (4-year) graduates identified as part of the 2016 graduation cohort. Participants included only those who were enrolled in the school district for a minimum of 680 days which is the equivalent of enrollment in the District for the entirety of their high school career.

Data Collection

All participant data, course history, attendance, cumulative unweighted grade point average, post-graduation intent response, and post-graduation position response was previously gathered school district information. Permission for use of requested on-the-shelf data was approved through appropriate school district protocol and procedures for research and request of student data use. Non-coded numbers were used to display student data resulting in no individually identifiable information. All data received for the study remained confidential and only data relevant to the research questions was utilized.

Research Questions

What is the relationship between career and technical education intensity and high school seniors college and career readiness factors?

Sub Questions

Question 1: What is the relationship between career and technical education intensity and high school seniors cumulative unweighted grade point average?

Question 2: What is the relationship between career and technical education intensity and high school seniors' attendance?

Question 3: What percentage of high school seniors' post-graduation intent matches post-graduation position by career and technical education intensity?

Data Analysis

Question 1 was analyzed using Spearman's rank-order correlation to measure the relationship between two variables when both are measured on ordinal scales.

Question 2 was analyzed using Spearman's rank-order correlation to measure the relationship between two variables when both are measured on ordinal scales.

Question 3 was analyzed using descriptive statistics to summarize, organize and simplify variable responses.

CHAPTER FOUR: Results

The purpose of this study was to determine the relationship between the intensity of Career and Technical Education experience and College and Career Readiness of high school seniors. Career and Technical Education (CTE) intensity was determined by the number of unique CTE courses the students enrolled in during their high school experience. College and Career Readiness measurement included common student success variables of attendance and cumulative unweighted grade point average, along with student responses regarding intent and reality for the future.

Research Question

What is the relationship between career and technical education intensity and high school seniors' college and career readiness factors?

Sub Question 1

What is the relationship between career and technical education intensity and high school seniors' cumulative unweighted grade point average?

Sub Question 1 was analyzed using Spearman's rank-order correlation to measure the relationship between two variables when both are measured on ordinal scales. Sample participants were put into categories by the number of unique CTE courses taken. Cumulative unweighted GPA of each participant in each category was gathered and used to calculate the average cumulative unweighted GPA for each category.

The highest average of cumulative unweighted GPA was assigned a rank of 1, while the lowest average of cumulative unweighted GPA was assigned a rank of 18. Categories of unique CTE courses, determining intensity, were ranked with the greater number of unique CTE courses taken assigned as 1 and no unique CTE courses assigned as 18. As seen in Table 1, the correlation of the data showed there was not a statistically significant relationship between CTE intensity and high school seniors' cumulative unweighted grade point average, $r_s = -.282$, $n = 18$.

TABLE 1: *Spearman Rank-Order Correlation Coefficient for Relationship Between CTE Intensity and High Schools Seniors' Cumulative Unweighted GPA*

Number of Sample Participants	Number of Unique CTE Courses	Number of Unique CTE Courses RANK	Average Cumulative Unweighted GPA	Cumulative Unweighted GPA RANK	r_s
44	17-24	1	2.85	3	-.282
34	16	2	2.73	7	
49	15	3	2.56	14.5	
51	14	4	2.80	5	
72	13	5	2.61	11.5	
92	12	6	2.63	9.5	
113	11	7	2.43	17	
152	10	8	2.56	14.5	
123	9	9	2.40	18	
187	8	10	2.61	11.5	
159	7	11	2.45	16	
206	6	12	2.63	9.5	
132	5	13	2.60	13	
197	4	14	2.74	6	
83	3	15	2.71	8	
168	2	16	2.90	2	
57	1	17	2.83	4	
173	0	18	3.10	1	

A negative correlation is a relationship between variable in which one variable increases as the other decreases, or vice versa. A perfect negative correlation would be equal to -1.00 and would mean a direct relationship always exists with the decrease in one variable meeting the increase in the other. A negative correlation may not be an unwanted occurrence depending on the variables. Although our data for Sub Question 1 results in a negative correlation that is not statistically significant, the correlation is of interest.

A deeper look at the data shows the average cumulative unweighted GPA at the highest in both areas of low intensity and high intensity of unique CTE courses. As average cumulative unweighted GPA moves to the lowest average, the number of courses is at the mid-range rank of nine.

This particular data point could represent a tipping point of intensity that could support the studies regarding student engagement and increased risk of dropping out of high school. The literature referred to a combination of one CTE course for every two core academic courses yielding the lowest risk for student dropouts. Students above or below this ratio, were at a high risk of not completing high school (Plank, DeLuca & Estacion, 2008) .

Cumulative unweighted GPA takes all courses within a student's high school experience as part of the calculation with no regard for per academic course ratio. It could be expected that students which fall in the lower intensity categories displaying high cumulative unweighted GPA's are closer to the 2 to 1 recommended ratio of course taking.

While those on the other end of the intensity level (high) and displaying high cumulative unweighted GPA's are a result of student engagement. Previous studies support the idea that students participating in CTE are more engaged in school as a result of the substantial connection between day-to-day classwork and future goals, whether college or career (Gottfried & Plasman, 2017).

Sub Question 2

What is the relationship between career and technical education intensity and high school seniors' attendance?

Question 2 was analyzed using Spearman's rank-order correlation to measure the relationship between two variables when both are measured on ordinal scales.

Sample participants were put into categories by the number of unique CTE courses enrolled in. Days absent of each participant in each category was gathered and used to calculate the average of days absent for each category.

The highest attendance average, or the most average days absent, category was assigned a rank of 1 and best attendance, or the least average days absent, category was assigned a rank of 18. Categories of unique CTE courses, determining intensity, were ranked with the greater number of unique CTE courses taken assigned as 1 and no unique CTE courses assigned as 18. As seen in Table 2, the correlation of the data showed there was not a statistically significant relationship between CTE intensity and high school seniors' attendance, $r_s = -.166$, $n = 18$.

TABLE 2: *Spearman Rank-Order Correlation Coefficient for Relationship Between CTE Intensity and High Schools Seniors' Attendance*

Number of Sample Participants	Number of Unique CTE Courses	Number of Unique CTE Courses RANK	Average Days Absent	Average Days Absent RANK	r_s
44	17-24	1	38.51	18	
34	16	2	48.57	15	
49	15	3	54.61	6	
51	14	4	47.50	16	
72	13	5	52.59	9	
92	12	6	50.01	14	
113	11	7	58.00	3	
152	10	8	54.00	7	
123	9	9	59.47	2	
187	8	10	52.43	10	
159	7	11	56.68	4	
206	6	12	56.03	5	
132	5	13	53.16	8	
197	4	14	50.77	13	
83	3	15	62.03	1	
168	2	16	51.30	12	
57	1	17	52.22	11	
173	0	18	44.83	17	
					-.166

Sub Question 2 results in a negative correlation. The negative correlation is a relationship between variables in which one variable increases as the other decreases, or vice versa. Similar to Sub Question 1, there is no statistical significance; however, a further look at the data may be warranted. The best attendance averages are present at each end of the intensity level; students enrolling in no CTE courses averaging 44.83 days absent, while students enrolling in 17 to 24 unique CTE courses averaging 38.51 days absent.

As student enrollment in unique CTE courses nears the mid-range of categories, the average days absent of students show an increased pattern. Category 9 (enrollment in 9 unique CTE courses) displaying the second highest average days of student absences. Data outliers in category 15 (enrollment in 3 unique CTE courses) and category 3 (enrollment in 15 unique CTE courses) are curious and require further investigation to determine actual attendance anomalies.

Sub questions 1 and 2 data show no statistical significance; however, give cause for deeper review of the data. Utilizing common measures of student success, such as attendance and cumulative unweighted grade point average, to determine student engagement and achievement of college and career readiness requires recognition that many influences exist in the resulting data. Implications for further research in regard to these influences will be discussed in more detail in Chapter 5.

Sub Question 3

What percentage of high school seniors' post-graduation intent matches post-graduation position by career and technical education intensity?

Question 3 was analyzed using descriptive statistics to summarize, organize and simplify variable responses. Responses to post-graduation intent and post-graduation position is routinely collected information available from the school district where the research occurred. Surveys are administered to seniors prior to graduation to gather post-graduation intent. An additional contact is made approximately six months following graduation to gather post-graduation position. Each participant responded with an option corresponding to the post-graduation role.

Response	Role
0	Unavailable
1	2-year College
2	4-year College
3	Employment
4	Military
5	Undecided
6	Other

To determine CTE intensity, study participants were categorized based on the number of unique CTE courses enrolled in during their high school experience. The greater the number of unique CTE courses, the higher the intensity of CTE. A total number of respondents was determined for each category. Data observation established the number of responses that were equal in post-graduation intent and post-graduation position. The number of responses when intent equaled position was recorded for each category. A percentage of equal responses was then calculated for each category by dividing the number of responses when intent equaled position by the number of respondents for that category (see Table 3).

TABLE 3: *Percentage of Post-Graduation Intent Responses Equal to Post-Graduation Position Responses by Courses Taken*

Number of Unique CTE Courses	Number of Respondents	Number of Responses When Intent Equals Position	Percent of Equal Responses
17-24	34	13	38%
16	28	9	32%
15	34	11	32%
14	36	9	25%
13	55	13	24%
12	77	23	30%
11	81	21	26%
10	115	37	32%
9	79	17	22%
8	145	50	34%
7	112	34	30%
6	159	49	31%
5	103	28	27%
4	149	39	26%
3	64	17	27%
2	129	38	29%
1	40	12	30%
0	140	55	39%

Percentages of post-graduation intent equal to post-graduation position is greatest on each end of the number of unique CTE courses spectrum. Of the 140 responses of students taking no CTE courses, 55 responses reveal that student intentions for the future prior to graduation was the position, or reality following graduation. While the 34

responses of students taking more than 16 CTE courses, resulted in similar percentage of intentions to position.

As possible responses for student intent and position are reviewed, a clear connection exists options 1 through 4 and development of college and career readiness. A factor in being college and career ready is capitalizing on personal interests and developing skills and abilities is having a plan for the path following graduation. Table 4 displays the data that includes the college and career ready responses of 1) 2-year College, 2) 4-year College, 3) Employment and 4) Military.

TABLE 4: *Percentage of Post-Graduation Intent Responses Equal to Post-Graduation Position Responses by Courses Taken for Responses of 2-year College, 4-year College, Employment, and Military*

Number of Unique CTE Courses	Number of Respondents	Number of Responses When Intent Equals Position	Percent of Equal Responses
17-24	33	13	39%
16	22	8	36%
15	26	11	42%
14	27	9	33%
13	40	13	33%
12	60	23	38%
11	58	17	29%
10	90	32	36%
9	59	15	25%
8	111	45	41%
7	73	33	45%
6	117	46	39%
5	74	25	34%
4	112	37	33%
3	48	15	31%
2	95	34	36%
1	36	11	31%
0	113	51	45%

Upon initial review, little difference is observed in the overall data presented in Table 3 versus Table 4. Percent of equal responses increased slightly in each category of number of unique CTE courses. A deeper observation reveals the greatest increases present not at the ends of spectrum, but rather the mid-range. Unlike Table 3 where the

top two percentages existed on the ends of the spectrum, Table 4 data sees enrollment in both 7 and 8 unique CTE courses showing 41% and 45% respectively. These percentages represent 2 of the top 3 equal responses.

Another interesting comparison of data tables include the consistency of the “Number of Responses When Intent Equals Position” for the number of unique CTE courses of 17-24, 15, 14, 13, and 12. Student responses where intent equaled position were exactly the same for the higher CTE intensity levels. This occurrence could support the notion that higher CTE intensity assists students in developing a feasible path for post-graduation.

Results for Sub Question 3 provide insight into student intention as it relates to future position. As supported in Chapter 2 literature review, there is a need for additional longitudinal studies to know more. Current research is short-term and only relates to the initial position of students immediately following graduation. Many factors could impact the path of a student within the six-month period following graduation, therefore a short-term inquiry may not reflect the true position of high school graduates.

CHAPTER FIVE: Conclusions and Discussion

The goal of education is to develop graduates to be contributing members of society, which ultimately includes being college and career ready. However, as schools, districts and states struggle with what college and career readiness means, it is difficult to hold them accountable. According to the Council of Chief State Officers & Education Strategy Group, four common components exist in current college and career readiness definitions: academics, critical thinking, collaboration/communication, and perseverance (2017). The specific words may vary from state-to-state, but all are struggling with how these components relate to current educational practice or measures.

The purpose of this study was to determine the relationship between career and technical education intensity and the college and career readiness factors of high school seniors. Sub question variables included relationship to cumulative unweighted grade point average and attendance as a measure of engagement. Is it possible for students to demonstrate specific college and career ready components in traditional ways? Are current measures of success also measures for college and career readiness?

The previous chapter outlined statistical significance of tests and the correlation coefficient for research sub questions 1 and 2. Spearman rank-order correlation measures the consistency of the relationship between ranked variables, independent of the form of the relationship (Gravetter, 2013). While neither of the research sub questions were deemed statistically significant, it is important for the researcher to review the strength of the relationship as determined by the correlation coefficient. The resulting correlation coefficient (r_s) is between -1.0 and 1.0 . A positive value nearest to 1.0 indicates a strong

tendency for the paired ranks to be equal. While a negative value indicates a tendency for the paired ranks to be opposite. A coefficient of zero indicates no relationship between the sets of ranks (Welkowitz, Cohen & Lea, 2011).

The correlation coefficient can be interpreted in terms of effect size. The effect size describes the strength of the relationship between the two variables. Levels of interpretation suggest effect size is small at the .1 level, medium at the .3 level and large at the .5 level. Taking this into consideration, the researcher needs to analyze the data thoroughly as relationships may not always be obvious (Welkowitz, Cohen & Lea, 2011).

Sub Question 1 Conclusion

The purpose of this research question was to determine the relationship between career and technical education intensity and high school seniors' cumulative unweighted grade point average. The correlation of the data showed there was not a statistically significant relationship between CTE intensity and high school seniors' cumulative unweighted grade point average, $r_s = -.282$, $n = 18$.

Cumulative unweighted grade point average is being utilized as a single measure of readiness for high school seniors; however, many factors must be considered in the development of this measure. Cumulative GPA calculates using all courses that are part of a student's high school portfolio. This study did not take into account the full make-up of these classes including those required for high school graduation, but focused only on enrollment in career and technical education.

Grade point average is a representation of student final course grades through an average of the total courses attempted. Final course grades are a measure that reflects

many aspects of the learning environment. Although a consistent way to rank all students, consistency does not exist in the elements used to reach the final course grade. This study looked only at the enrollment in the CTE courses, not the actual final grades earned in the CTE course.

Sub Question 2 Conclusion

The purpose of this research question was to determine the relationship between career and technical education intensity and high school seniors' attendance. The correlation of the data showed there was not a statistically significant relationship between CTE intensity and high school seniors' attendance, $r_s = -.166$, $n = 18$.

Attendance is predicated with engagement in the school, both with course content and caring adult relationships. This particular study did not account for specific teacher strategies utilized within the schools or relationships developed in efforts to engage students, especially in the career and technical education classroom.

Sub Question 3 Conclusion

The purpose of this research question was to determine what percentage of high school seniors' post-graduation intent matched post-graduation position by career and technical education intensity. Students determining and preparing for the path they want to take after high school is essential to being college and career ready. Career and technical education courses provide a classroom environment to explore possible paths.

As the data revealed, there is little difference in students' participating in CTE courses and those not participating in CTE courses in having that plan for the future.

While this particular question only looked at equality in intent versus position, it did not take into account whether the courses taken had prepared students for their chosen path.

Discussion

The high school experience is a four year journey for students that involves planning for and making decisions in regards to their future. How do we ensure that our graduates are ready for the path they choose? How do we ensure that programs exist in our schools to develop college and career readiness in graduates? If these programs do exist, how do educational leaders adequately measure the effectiveness of programs to guide implementation?

Employers are asking for employees who have more than academic skills. They are in need of a workforce which can meet the professional and interpersonal demands of the job. Colleges are increasing the number of remedial courses available to students in an effort to boost learning for success within the post-secondary world. Education at the high school level is a place that both of these concerns can, and are, being addressed through CTE. Unfortunately, there is a misperception within our schools and communities on the value CTE has on the college and career readiness of students. High school leaders are choosing to focus solely on academic skills by increasing academic requirements and doubling up on academic courses in hopes to raise proficiency levels on test scores.

The idea that students must either choose to further their education or enter the workforce is a tracking system that education has tried before, we do not want to repeat this mistake. All students should have the opportunity to change the direction of the path they are on. The high school experiences should be less about earning arbitrary credits

and more about what the student is actually learning. College and career ready does not mean one or the other, but a system that allows for the integration of academic, technical and professional skills. These skills must be intertwined throughout the high school experience and “ultimately validated by a student’s successful transition to life beyond high school” (Destination Known, 2017).

Resources within the educational system are often scarce and educational leaders must constantly make decisions regarding programming and what is best for kids. If no accountability measures exist for programs outside of the core academics, then how is a leader to determine the value for students? With the passage of ESSA, states now have the opportunity to shift some of the accountability focus to college and career readiness. Although the door is open for CTE to be part of this accountability, state leaders are trying to attach common measures of academic success to college and career readiness. Developing measures that allow for a greater understanding on the learning gaps that exist in our schools in relationship to student preparedness is important. These measures initially will need to be longitudinal as a student’s readiness for the future can and should not be measured until the future occurs.

CTE provides a natural connection to college and career ready graduates. Even prior to the passage of Perkins IV which required academic integration, the CTE classroom has incorporated academics in a manner that is relevant for the student. Unlike a core academic teacher, rarely does a CTE teacher get asked, “When am I ever going to use this?” or “Why do I need to know this?” Content within the CTE classroom is relevant not only to the present day needs of the student but connected to aspirations for the future.

Choice exists for students to elect to participate in CTE courses or programs of study. Many factors influence the course selection patterns of students; however, the greatest influence should not be the unrealistic misperception of society on what CTE is and has to offer. Decision makers at the school and district level should not rely on outdated philosophies of vocational education to limit the elective opportunities provided to students. Rather students should be able to make informed decisions based on unbiased career guidance provided at the school level.

Student experiences in the CTE classroom relate to an area of interest or personal goal which assists in the intrinsic motivation to learn and demonstrate mastery. The learning is not about simply achieving a grade or earning a credit and forgetting the information after the test. It is about preparation for the next phase of the student's life. A phase that can be determined by the student with clearly articulated steps to get there – whether it involves college or career.

Implications for Further Research

Evidence exists for further studies that look deeper into the specific strategies and engagement that are found in CTE programs. Having the opportunity to focus on the preparatory nature of programs of study is more important than looking at stand-alone courses for the sole purpose of graduation. Much of the literature refers to the achievements of CTE completers or concentrators which goes beyond a one and done course approach. Rather than students simply completing a variety of CTE courses, future research would look at the intensity of career and technical education as a chosen pathway or cluster of related learning. With a clear result in mind, does the focus of the

student learning around a personal area of interest lead to greater college and career readiness?

It would also be beneficial to determine not only the exposure to these courses, but the attainment of credits. Taking a high school class and earning a high school credit are not synonymous. A student who takes a course and earns a failing grade may have a very different experience than a student who takes a course and earns a passing grade (or credit). What made the experiences so different? What previous educational successes or failures did the student encounter? How did these previous experiences influence the current experience?

Beyond the traditional idea of grades, further research would benefit from the focus on knowledge and skills present within a class. Failing or low course grades can be a compilation of many factors, all of which are not always in the student's control. Students who receive failing grades or do not receive a credit may still be learning and mastering course content. Looking deeper at the motivation of the student to take a course and the expectations for learning as it relates to personal future goals would provide a clearer picture of CTE as it pertains to college and career readiness.

Conducting a mixed method study adds a qualitative component providing a deeper understanding of a student's course history. What motivates a student to enroll in particular elective courses? What is the student's goal in selecting one class over another? Do students see the class as a better option for future endeavors or are they just dabbling in a current interest? It may not be sufficient to look only at the enrollment in specific courses, but rather the why behind the course selections. Students have different reasons for taking courses or completing programs of study. Knowing these reasons could assist

schools in developing offering learning experiences that meet the immediate needs of the students as it relates to preparation upon graduation.

An additional component of the previously mentioned research would be the student perspective on course expectations and course reality. Knowing why a student chose to enroll or participate in a class, does not tell us whether the expectation for learning was met. At the beginning of a course, surveying students to gain their reasons for enrolling, as well as, expectations for learning. Upon completion of the course having a follow-up process to determine if the learning experiences met the individual needs of the students. Was the expectation of learning prior to the course equal course experience?

Finally, a greater longitudinal study could be conducted to span the opportunities of CTE beyond secondary education. Developing a study that begins with the exploratory opportunities in elementary and middle school, and extends through high school into post-secondary and culminating in adulthood. A longitudinal study that spans various learning levels provides the opportunity to gain insight of the relationship of student interest and intent, with attainment of knowledge and skills, leading to success in the adult role which becomes the measure for college and career readiness.

Initially, the under researched area of student attrition for high school graduates to post-secondary could be addressed. Colleges and universities track enrollment and degree attainment information; however, a longitudinal study which follows CTE participants through the educational journey could provide insight into the requirements of the CTE program to go beyond college readiness to college preparedness. Such a study could help determine the attrition of students who participate in CTE courses or programs of study at the high school level into the post-secondary realm. Minimal data exists where students

ultimately end up beyond the initial follow-up of high school graduation. Is it enough to say that a high school prepares students for college, if they enroll in a post-secondary institution?

Another strand of the longitudinal study could focus on career readiness. Following the student progression from elementary or middle school through high school and into adulthood could provide insight into the development of the necessary knowledge and skills to enter the workforce. Further, looking specifically at the concentration of courses taken by students within a given pathway or program of study, through longitudinal data, could result in a correlates of completion to career choice. Are students considered CTE completers/concentrators more likely to enter a career in the field of study taken in high school?

Conclusion

The purpose of this study was to determine the relationship of career and technical education intensity on a high school senior's college and career readiness. The designated variables (cumulative unweighted grade point average, attendance, and post-graduation intent versus post-graduation position) showed no statistical significance to CTE intensity. The strength of relationship between CTE and college and career readiness, however, should not be discounted.

The review of literature shows inconsistencies in the results of previous studies and the student populations that may or may not benefit from career and technical education programs. These studies, utilize common measures of student success which are influenced by too many factors, are inconclusive in determining effectiveness of CTE. Yet, as changes come to educational accountability and schools are asked to produce

college and career ready graduates, there must be appropriate measures to validate this accomplishment.

The transition of vocational education to career and technical education has not been fully accepted across all aspects of public perception. The original ideas grounded in vocational education to develop specific skills for one particular job and only for those not continuing to post-secondary opportunities has been replaced with new ideas. CTE encompasses core academics, professional skill development and more learning activities as a way to bridge that gap between current practice and preparing students for the future.

After all, each level of education is preparatory. . . whether it is for the next level of formal education or for the ultimate goal of contributing to society through one's work.

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